

**Statement of
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Before the
Subcommittee on Science, Technology and Space
Committee on Commerce, Science and Transportation
United States Senate**

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Mr. Chairman, and Members of the Subcommittee:

As NASA's Associate Administrator for Policy and Plans, I am both pleased and honored to be here today to discuss a broad spectrum of issues relating to assured access to space and NASA's strategic vision of the future—a vision in which, ultimately, the commercial sector provides routine transportation services for all of NASA's Earth-to orbit needs.

Mr. Chairman, we are at the dawn of a new millennium, a millennium in which, with respect to science and technology, almost anything is possible. While we cannot know exactly what the science and technology of the future will bring us, I think that all of us can agree that the space frontier will play an important role in the high technology activities of the future. Space holds the potential to be the crossroads of U.S.-led commerce, science, research, technology and exploration. Imagine a world where a significant portion of the U.S. share of world commerce takes place in space...where commerce of all kinds, ranging from research and development to space tourism, is safe, routine, and affordable, and the Government is but one of many customers of the commercial space transportation sector.

However, while the promise of the space future may seem limitless, that promise will not be realized without affordable and reliable access to space.

A primary goal of NASA's investments in space is to ensure maximum safety and lower our future space transportation costs, through commercially-owned and -operated systems with very high reliability. At NASA, we are concerned by the recent series of space transportation failures of ELVs. While none of these were NASA launches, this is a difficult time for the space launch vehicle industry, as well as for those who, like NASA, depend on it for access to space and successful business operations.

In the launch of NASA payloads on expendable vehicles, we have chosen to err on the side of caution. We have recently begun an intensive internal review of all NASA ELV assurance processes and recent launch vehicle failures. This review is scheduled to take place between now and the end of 1999. Safety is NASA's guiding value and a top priority. This value will continue to underscore any decision we make regarding the

launch of all of NASA's missions. We will continue to be conservative as we focus on safety and mission assurances, and will continue to work closely with our launch service providers to maximize the probability of success of NASA missions.

We are also participating in the Department of Defense/Administration review of launch vehicles, and stand ready to assist in additional on-going non-NASA safety and incident failure reviews.

Space Access Challenges

Some of the technology in our launch vehicles and space transportation systems is over a quarter of a century old. Our space transportation infrastructure remains people-intensive and too expensive to stimulate and enable robust commercial activity. For example, the cost of getting to space on the Space Shuttle is simply too expensive— at about \$10,000 a pound to LEO. Somewhat lower but still expensive, commercial launch prices limit space business development and research and development by the private sector.

These space transportation challenges are critically important to our national security, scientific, technical, commercial, and foreign policy goals. In response to these challenges, the President's 1994 National Space Transportation Policy established a clear division of responsibilities between agencies involved in launch activities and set the course for the future development. The Defense Department is improving and evolving the current fleet of expendable launch vehicles. NASA is responsible for improving the Space Shuttle and developing and demonstrating NASA's Reusable Launch Vehicle (RLV) technologies. Both agencies involve the U.S. commercial space sector as partners, participants, and investors in these programs.

In the remainder of my testimony today, I will highlight NASA's progress in implementing this policy, future decisions that we intend to make to lower NASA's launch costs through commercial space transportation systems, and the role of Government incentives in improving commercial space transportation.

Space Shuttle

In the past decade, we have continued to improve shuttle technology and performance in the following ways:

- space Shuttle main engine upgrades
- super lightweight tank
- orbiter upgrades
- mission control
- launch control

Indeed, we have achieved significant efficiencies in Shuttle operations while we improved safety. From FY 1993 to FY 1995, the annual Shuttle budget decreased 29 percent (37 percent with inflation), while the measures of Shuttle safety and performance improved dramatically. Over the same time period, we improved the manifest lead-time by 28 percent, and increased the maximum lift capacity to the International Space Station by 71 percent.

The Shuttle system has provided reliable access to space, routinely, over the past two decades. For the future, we need a whole new generation of space transportation systems—systems which are commercially owned and operated, and are more efficient, affordable and, most importantly, safer. If we do not take strong action, America's civil space program, and our ability to be a leader on the "high frontier," will be limited by the prohibitively high costs of space transportation and operations.

Advanced Space Transportation Technology

To help bring about this new generation of space transportation systems, NASA's Advanced Space Transportation Technology program invests to reduce the technical risk of new commercial launch vehicles. Our goal is to revitalize access to space by developing technology to reduce launch costs dramatically over the next decade, increase the safety and reliability of current and next generation commercial launch vehicles, and establish new plateaus of performance for in-space propulsion, while reducing cost and weight. We are committed to developing technology that will increase safety and reliability by at least a factor of two, and reduce the payload cost to low-Earth orbit by an order of magnitude, from \$10,000 to \$1,000 per pound, within ten years. NASA's budget request, \$254 million, supports this goal.

NASA's Reusable Launch Vehicle Program includes both ground-based technology development and flight demonstrators (X-33, X-34, Future-X Pathfinder vehicles) to validate key component technologies, prove that the technologies can be integrated into a functional vehicle, and demonstrate the required operability to make low-cost access to space a reality. Once demonstrated, we expect that these technologies will be used by private industry to build next-generation commercial launch vehicles that will meet Government and commercial needs at dramatically reduced costs. NASA is investing over \$1 billion in RLV technologies.

Space Transportation Architecture Studies

NASA's pursuit of cheaper, more reliable space transportation for the next century continues with the ongoing, industry-led Space Transportation Architecture Study (STAS).

The STAS Study was initiated in 1998 to help NASA develop an investment strategy for

reducing the cost of access to space by using commercial capabilities. The study is assessing:

- 1) if the Space Shuttle should be replaced;
- 2) if so, when the replacement should take place and how the transition should be implemented; and,
- 3) if not, what upgrades should be made to continue safe and affordable flight of the Space Shuttle.

NASA awarded study contracts to the Boeing Corporation, Kelly Space and Technology, Lockheed Martin Corporation, Orbital Sciences Corporation, and Space Access – representing a spectrum of players in the launch vehicle business – to solicit their assessments of future options that could feasibly commercialize NASA’s space launch requirements. Kistler Aerospace also participated in this activity with no exchange of funds.

The industry teams gave NASA their final reports in late January. These results have been independently assessed and integrated by an in-house team into space transportation architecture options. Over the next few months, additional work will be tasked to refine and further develop some of these options. As we examine alternative space architecture options, safety and reliability will continue to be our top priority, with dramatic cost reductions as our ultimate goal.

The STAS will help us understand how we can make technology investments to leverage commercial launch capabilities that transition us away from owning and operating space transportation systems and toward private sector competition for NASA’s launch requirements. From these options, the NASA Space Transportation Council will make recommendations this summer to the Administrator concerning a future space transportation investment strategy.

We have reserved \$1.2 billion in NASA's out year budget to provide resources for technology and vehicle investments to reduce our launch costs. Based on the STAS results and recommendations from NASA's Space Transportation Council, the NASA Administrator will make recommendations to the Administration on strategies to reduce NASA’s launch costs as part of the FY2001 budget process. The end result will determine how the \$1.2 billion will be spent and the specific strategy NASA will implement. We expect that the entire \$1.2 billion will be needed for technology and vehicle investments to implement this strategy. We also expect these decisions to affect plans and other funding in NASA's budget for Space Shuttle upgrades, the Crew Return Vehicle for the International Space Station, and other space transportation technology investments. Our intent is to have an integrated plan for lowering NASA's space transportation costs that sets definitive goals for when NASA will procure all of its Earth-to-orbit needs on commercially-owned and -operated vehicles.

Government Incentives

Industry faces two major types of risks in developing new commercial launch systems—technical risks and business risks. NASA's technology investments help to reduce technical risks while growth in the commercial launch market over the past few years, the availability of financial capital, and potential future Government incentives help to reduce business risks. Some common conclusions of the STAS activities to date support Government incentives as a means of reducing the business risks to industry of developing new commercial launch vehicles. Industry participants in the studies emphasized that a robust NASA technology risk mitigation program is the top priority in enabling low-cost access to space on commercial vehicles. The studies further indicated that other Government incentives such as development cost sharing, advance purchase agreements, and loan guarantees may be essential to the private financing of new commercial launch vehicles.

NASA applauds Senator Breaux's efforts to address new commercial launch vehicle business risks through the introduction of S. 469. The Breaux bill raises important technical issues that need work regarding how loan guarantees for commercial launch vehicles would be scored and about the appropriate level of risk that should be taken by the financial institutions making the loans. S. 469 complements NASA's investments to reduce technical risk by outlining one tool, improved access to financial capital, that could reduce the business risk to the launch industry in developing new commercial vehicles.

Finally, a word should be said about the critical importance of the Government role in continuing to provide the essential underlying legal framework within which the launch industry can operate. NASA supports the extension of the payment claims provision of the Space Launch Act, (49 U.S.C., 70113) which is due to expire December 31, 1999. This provision authorizes the Secretary of Transportation to provide for the payment of claims of third parties for liabilities in excess of insurance coverage carried by the licensee's launch company, subject to Congressional appropriations. The Administration supports the extension of this indemnification authority because it prevents a potentially crippling financial burden from being placed on commercial launch activities.

We also strongly urge Congress to extend similar indemnification authority to NASA in connection with its experimental aerospace vehicle programs, Future-X, as requested in the Administration's proposed NASA authorization bill. This is of immediate relevance in our ongoing discussions with industry regarding the X-37 program.

Conclusion

Through the RLV technology, Shuttle upgrades, and Evolved Expendable Launch Vehicle programs, NASA and DOD have shown that this Administration is serious about the sustainment, modernization, and cost reduction of U.S. launch capabilities through real programs with real investments.

After making substantial investments over the past few years, NASA and the Administration will make key decisions during the FY 2001 budget process on a strategy to lower NASA's launch costs through commercially-owned and -operated launch systems. If technical details are adequately addressed, Government incentives may play a complementary role to NASA's technology investments in reducing certain risks to the launch industry in developing new vehicles.

Again, Mr. Chairman, NASA applauds the Committee's work on the critical issue of reducing the cost of access to space through commercially-owned and -operated vehicles.

Thank you very much. And now, I would be pleased to respond to any questions you may have.